Atty. Dkt. No. 200315385-1

REMARKS

Interview Summary

A telephonic interview was held on July 13, 2007. The undersigned and examiner Rojas were in attendance. During the interview, the rejection under 35 U.S.C. § 112, second paragraph, was discussed as well as the rejection under 35 U.S.C. § 102 in view of Matsunami. Specifically, with regard to the rejection under 35 U.S.C. § 112, the undersigned explained the meaning of the quorum condition recited in claims 9, 25 and 32. Details of this explanation are given below. With regard to the rejection under 35 U.S.C. § 102 in view of Matsunami, the undersigned explained that Matsunami does not anticipate applicants' claims at least because Matsunami does not disclose two rounds of messaging. Details of the argument are also given below.

In response to the undersigned's remarks, examiner Rojas indicated her agreement that rejection 35 U.S.C. § 112 and the rejection under 35 U.S.C. § 102 were likely overcome. Examiner Rojas indicated that she would like more time to consider the arguments made during the interview and suggested that the undersigned submit the substance of the arguments as an after-final response. Accordingly, the applicants submit the substance of the arguments presented during the interview in this paper. The undersigned would like to thank examiner Rojas for her time and consideration.

Rejection under 35 U.S.C. § 112:

Independent claims 9, 25 and 35 were rejected as allegedly being indefinite on the grounds that is it unclear what is meant by "the first and second quorums meeting a quorum condition of a number such that any two selections the number of stripe blocks intersect in a minimum number of the stripe blocks needed to decode the stripe." The applicants respectfully disagree. The applicants' specification explains that data is stored across n of the storage devices as a stripe of erasure coded data comprising n stripe blocks. The n stripe blocks may comprise m data blocks plus p parity blocks ($n = m + p$). The p parity blocks may comprise 2f parity blocks, where f is a number of the n stripe blocks that are tolerated as faulty ($n = m + p = m + 2f$). A quorum is defined as a number of the n stripe blocks that meets a quorum condition. The applicants define their quorum condition such that any selection of two sets of the n stripe blocks intersect in m of the n stripe blocks. Therefore, if the n stripe blocks

are encoded as the m data blocks plus the p parity blocks and p is an even number, the quorum is m + p/2. If the n stripe blocks are encoded as the m data blocks plus the p parity blocks and p is an odd number, the quorum is m + p/2 + 1/2. See applicants' specification at page 4, line 29 to page 5, line 2.

To clarify this concept further, suppose that the number of data blocks, m, is four (i.e. m = 4) and the number of parity blocks, p, is three (i.e. p = 3). Therefore, in this example, the set of stripe blocks has seven members (n = 7, since n = m + p). Because p is an odd number, the quorum is six (i.e. m + p/2 + 1/2 = 6). It can be verified that six is the correct quorum as follows. A first selection of six of the seven blocks leaves one block unselected. A second, different selection of six of the seven blocks would leave one other block unselected. Therefore, the two selections of six of the seven blocks intersect in five of the blocks. In other words, five blocks must be included in both selections of six of seven blocks. These five blocks are sufficient to decode the stripe. In fact, four blocks would be sufficient to decode the stripe. Therefore, in this example, the quorum is greater than the minimum number of blocks needed to decode the stripe. Conversely, it can be verified that a number less than six, such as five, does not meet the quorum condition. This is because a first selection of five of the seven blocks would leave two blocks unselected and a second selection of five of the seven blocks could leave as many as two different blocks unselected. Accordingly, the intersection of these two selections would be only three blocks. In other words, only three blocks must be included in both selections of five of seven blocks. However, three blocks is not sufficient to decode the stripe (since the stripe has m = 4 data blocks). Therefore, five does not meet the quorum condition. Any number less than five would also not meet the quorum condition.

In view of the above, the applicants respectfully submit that the quorum condition specified in claims 9, 25 and 35 is not indefinite.

Rejection under 35 U.S.C. § 102:

Independent claims 9, 25 and 35 are rejected as being anticipated by U.S. Patent No. 5,740,465 to Matsunami et al. The applicants respectfully disagree for a number of reasons. At least one reason is that each of these independent claims requires two rounds of messaging to and from the storage devices to complete the writing of data. Particularly, a query message is sent to the storage devices and a query reply is received. Then, a modify message is sent to the storage devices and a

write reply is received. At best, Matsunami discloses one round of messaging: a generated disk command is issued to each disk unit and a command end is received from each disk unit (see Matsunami at col. 10, lines 58-59). Therefore, Masunami et al. do not disclose the use of two rounds of messaging.

In discussing claim 9, the final office action relies upon elements shown in Figure 6 of Masunami and upon col. 10, lines 45-67, of Matsunami (the office action actually refers to Figure 1 of Matsunami, though the applicants believe that Figure 6 was meant since Matsunami discusses Figure 6 at col. 10, lines 45-67). See paragraph 1 of the office action mailed on March 23, 2007. At col. 10, lines 45-67, Matsunami explains that the command controller 6 receives plural host commands from a host computer. The host commands are received by host command input/output means 11 and queued by host command queuing means 12. The host commands are then interpreted and a plurality of the host commands are integrated into a disk command (by interpretation means 13 and command clustering means 14). The disk command is then sent to the disks by command start/end means 15 and a response is received from the disks. Therefore, this portion of Matsunami discloses only one round of messages between the command controller 6 and the disks. For at least this reason, Matsunami does not anticipate claims 9, 25 and 35.

Accordingly, the applicants respectfully submit that claims 9, 25 and 35 and their dependent claims are allowable.

For these reasons, the applicants submit that all the pending claims are allowable.

Respectfully Submitted,

Dated: July 15, 2007

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